DOCUMENT RESUME

ED 343 229 EA 023 771

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TITLE Bright Ideas: A Total Resource Management Guide for Schools.
INSTITUTION California Energy Extension Service, Sacramento.
PUB DATE 89
NOTE 37p.
PUB TYPE Guides - Non-Classroom Use (055)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Administrator Guides; Change Strategies; Cost Effectiveness; Databases; Elementary Secondary Education; *Energy Audits; *Energy Conservation; Energy Education; *Energy Management; Incentives; Inservice Education; Interpersonal Relationship; Leadership; *Program Implementation; Recognition (Achievement); Resource Allocation; School Districts; Teamwork
IDENTIFIERS *California

ABSTRACT

Reducing school energy costs can increase the discretionary dollars available in the school budget. The first part of this guide introduces the key elements of an effective energy management program. Through an evaluation of nearly 150 California school district programs and a detailed review of 22 exemplary programs, the 12 following elements emerged as crucial to making programs successful: (1) organize energy data; (2) build school board and top level administrative support; (3) cultivate maintenance and operations support; (4) support "idea champions" at all levels; (5) set yearly goals; (6) appoint an energy coordinator; (7) conduct an energy survey or audit; (8) provide training for all staff; (9) integrate energy education with energy management to involve teachers and students; (10) provide incentives and recognition; (11) develop district and school energy teams; and (12) make the program visible. The second part of the guide presents a school energy program as seen from the perspective of the following key players: school board, district administration, site administrators, facilities and service staff, teachers, and the community. Appended is a worksheet divided into energy team member sections with questions that refer to the key elements of a successful energy program. (MLF)

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# BRIGHT IDEAS

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

# A TOTAL RESOURCE MANAGEMENT GUIDE FOR SCHOOLS

**California Energy Extension Service**
Governor's Office of Planning and Research
1400 Tenth Street
Sacramento, California 95814

EA 023771



BEST COPY AVAILABLE

**Summer 1989**

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Additional copies may be ordered from the California Energy Extension Service, 1400 Tenth Street, Sacramento, CA 95814, (916) 323-4388, or from your Regional Energy Extension Center for Schools.

The California Energy Extension Service (CEES) is an energy management action program of the Governor's Office of Planning and Research. CEES works with school districts, small businesses, and professional education and energy management associations to develop programs that promote energy efficiency by providing direct, personalized services at the local level. Those who are interested in the services offered may receive quarterly updates on CEES activities by subscribing to **SaveEnergy** which is available free of charge from the CEES Office.

Direct service to schools is provided by Regional Energy Extension Centers (EEC). In northeastern California, contact the Carter House EEC at 916-241-8636. In the Sacramento and Sierra foothills, contact Gold Country EEC at 916-622-7130, ext. 270. In the San Joaquin Valley, call 209-488-3292. In the South Bay, call the Camino Real EEC in San Jose at 408-280-0990. In the East Bay, call the Energy Fitness Center at 415-451-0271. In "wine country", call the Sonoma EEC at 707-664-2306. In San Diego, call 619-292-3664. If your region isn't listed, contact CEES directly.

**ACKNOWLEDGEMENTS**

This guide would not have been possible without the original work by Don Rodriquez and Marilyn Bodourian, formerly of Cupertino Union School District, in 1984-85 and the cooperation of all those local energy managers and administrators who have operated model programs for CEES and/or on their own. This guide reflects their talent. We have taken their wisdom and compiled it in a manner we hope will be useful for others to avoid re-inventing the wheel.

It is inevitable that some good ideas were overlooked. We will be happy to provide updates to this guide and include new examples and experiences as they are brought to our attention. In the hope of sharing lessons learned by CEES programs, material presented in this guidebook may be reproduced freely so long as proper credit is given.

The following sources are suggested for further reference as they will be useful in developing programs suggested in this guide:

**Animated Bibliography, A Sample of Energy Education Curriculum Materials**, 1988, two volumes: K-6 and 7-12, by Bonnie J. Cornwall.

**Maintaining in the Nineties: Energy Management for Maintenance and Custodial Staff**, 1988, by Bonnie J. Cornwall and Lisa N. Geiger.

**How to Organize and Communicate Your Energy Data: A Guide to Energy Accounting**, 1985 by Bonnie J. Cornwall.

**How to Motivate Staff and Students to Save Energy**, 1984, by C. Dickson Schwarzbach and Jan Philbin.

**NOTICE**

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## WHY BOTHER?

Why should school administrators and staff work to save energy? The simple answer is money. Increased utility costs are eroding the educational budget. In some districts, utility costs are the highest cost next to personnel! Reducing school energy costs can increase the discretionary dollars available in the school district budget and provide resources that may be programmed into direct support for the classroom.

**Reducing school energy costs can increase the discretionary dollars available in the school district budget.**

*For example, Pomona Unified saved enough money to buy an additional 25,000 school books each year. East Side Union High School District saved enough to give staff a 2% raise in the first year of their energy program. In Clovis, for the two percent salary increases of several years ago to be maintained, energy reductions must remain constant. Clovis has done just that, even though average daily attendance has increased by 50%.*

### Improved Public Relations

Although the potential for cost reduction is great, a narrow focus on savings alone may not be enough to place energy on a school's agenda. A good energy program has implications for improved public relations as well, according to one retired superintendent, because the energy savings provide a quantifiable bottom line. The public is pleased the governing board is concerned with reducing administrative costs, increasing productivity and taking actions to improve school facilities. Energy programs have also decreased vandalism and created an atmosphere in which students can take pride in their schools.

On a more global level, energy conservation is being hailed as one approach to controlling problems such as acid rain and global warming trends. Electricity conservation, in particular, decreases the need to operate existing power plants thereby reducing the atmospheric accumulation of pollutants that cause some of these global environmental problems.

### Financial Resources for Education

Today, Californians use twice as much energy per person as industrial nations with similar standards of living and the state is the fourth largest energy user in the world. By the time today's kindergartners graduate from college, Californians are predicted to consume 20% more energy than today. Our future and economic well-being depends not only upon providing sufficient energy to meet basic human needs without sacrificing the environment, but upon the quality of education we provide students in the public schools. Ironically, with increasing energy costs eroding school budgets, wise energy use is linked to the financial capability of schools to develop needed educational programs.

### A Role For Everyone

Energy conservation in school buildings should be discussed and practiced by everyone, not just the custodian or energy manager. "It's not my job," is just an excuse. The perception that

**Of schools expressing interest in CEES school programs, nearly 98% feel they have some or great potential for further savings.**

energy is no longer a crisis also contributes to this lack of attention in many California schools.

Virtually all schools have taken some actions to reduce energy use. Of schools expressing interest in California Energy Extension Service (CEES) school programs, nearly 98% feel they have some or great potential for further savings. Yet, some districts have abandoned highly successful programs believing that once a certain level of energy savings had been achieved, the energy manager was no longer needed, and savings would naturally be maintained. That might be true if an energy program is just the installation of new, energy-saving equipment. But it's not. **Energy management depends on people.**

Witness the results from one program begun in the late 1970's with energy managers responsible for training, motivation, and utility bill analysis. In the first year, both electricity and natural gas consumption were cut by about 30%. By the fourth year, electricity use was down 43% and natural gas use down 55% and the district had "saved" about four million dollars. The manager positions were terminated in the middle of 1984-85. Over those next few months, natural gas use was up about 20% over its all time low in the previous year and electricity had begun to climb as well. It seems fairly obvious that dramatic cost savings were a result of people working as a team to manage energy use.

### Back-To-Basics

Energy management success hinges on a "back-to-basics" approach featuring the "Three R's": respect, responsibility, and recognition:

- **Respect** means listening to people's problems seriously whether it is a teacher who is too cold or a maintenance director whose preventive maintenance budget has been cut.
- **Responsibility** means expecting the most of staff and motivating them to go out and save energy.
- **Recognition** means giving people credit for reducing energy use.

These "three R's" help win staff support for the energy program.

## DON'T RE-INVENT THE WHEEL

**A memo from the Napa Valley Unified School District states, "The major contributing factor toward reducing energy consumption between 1975 and 1980 was communication."**

The fundamental purpose of this guide is to serve as a catalyst for ideas in energy management. The guide was designed to introduce a practical approach to energy management based on what is feasible without too much intrusion on your time and budget. The material included in this guide is based on successful programs in California schools.

Understanding that there is no true definitive energy management source book for schools, this guide is designed to give you success stories so you won't have to "re-invent the wheel." Just re-design it just a little so that is fits and feels right for your district.

**The guide consists of two volumes: The first introduces the key elements of an effective energy management program. The second volume goes into depth on the key players and their roles in a comprehensive program. It presents a school energy program as seen from the perspective of each "team member": school board, district administration, site administrators, facilities and service staff, teachers,students and the community.**

The field of energy management is one of constant change. There are new technologies and operational strategies being tested every day and many times it isn't a question of knowing the right answer, but knowing who to ask. In addition to workshops and other direct services provided by the regional energy extension centers, CEES publications are a good resource. For teachers, the annotated bibliography on energy education materials, *Animated Bibliography*, is perhaps one of the most comprehensive single source documents on the subject of energy education curriculum resources. Other valuable guidebooks have been developed for business managers and maintenance directors, such as *How to Motivate Staff and Students to Save Energy*, including the successful techniques and approaches employed by many California schools; *How to Organize and Communicate Your Energy Data: A Guide to Energy Accounting*, an introduction to utility bill analysis for that quantifiable "bottom line," *Tracking Utility Costs by Microcomputer*, is a review of the different computer software and strategies for energy accounting, and *Maintaining in the Nineties: Energy Management for Maintenance and Custodial Staff*, a two-volume handbook of how maintenance and custodial staff can contribute to an energy management program.

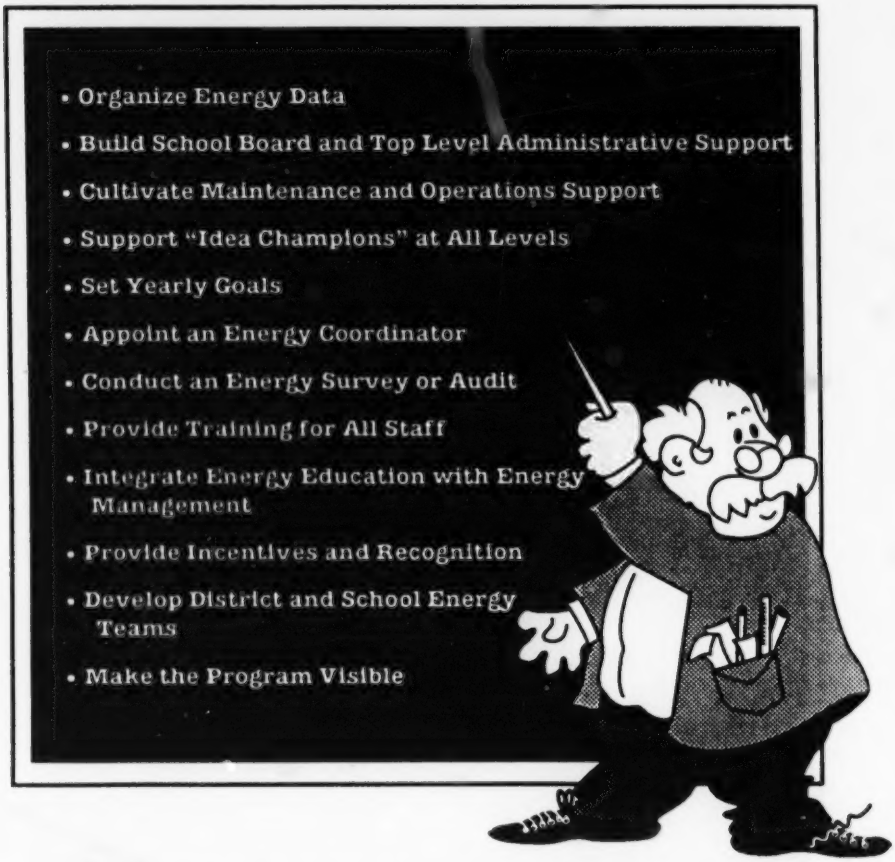
It should be stressed that this is a guide and not a book to read from cover to cover. Each section contains information that may be valuable to selected individuals within a school district. **Please feel free to reproduce sections of this book and distribute them to individuals who might put them to use.**

### A Self Assessment

Before you go on to the guide, take a moment to evaluate your present energy program. The worksheet in the back of this guide has been divided into energy team member sections. For each section, there are questions on the assessment form that refer to the key elements of a successful energy program.

## KEY ELEMENTS FOR A SUCCESSFUL ENERGY PROGRAM

Through the careful evaluation of strengths and weaknesses of close to 150 school district programs funded by the California Energy Extension Service and a detailed review of 22 exemplary programs in 1988, the twelve following "key elements" emerged as crucial to making programs successful:




Related work on sustaining innovation in schools and lessons from America's best-run companies also suggests factors necessary for achieving excellence in our schools. These include the importance of regular communication with school board members and administrators about the cost effectiveness of the program, an "idea champion" who first has a vision of the program, next, the managerial and promotional skills needed to guide the program, and finally, the ability to maintain the momentum of the program.

### People As A Resource

With the unifying theme of 12 key elements, this guide focuses on PEOPLE. Why? Because new equipment doesn't save energy, people do. This is really not a new theory. In their runaway bestseller, *In Search of Excellence*, Peters and Waterman maintain that our best run companies treat people as their greatest re-

source. Examining the most successful school energy management programs, this is particularly evident.

This guide will show the interrelationships that do exist between district departments with regard to energy management.and examine the roles of all the people in a school from the Administration, Facility and Services Staff, Principal, Teacher and Students to the Community. (A list of personal contacts or mentors has been included at the end of each chapter for information in a particular area of concern.)

The twelve elements rely on one key tool to insure their effectiveness, COMMUNICATION. An administrator can be more effective in managing energy in the district if he or she is keenly aware of the vital role communication can serve in reducing energy consumption. A memo from the Napa Valley Unified School District states, "The major contributing factor toward reducing energy consumption between 1975 and 1980 was communication." Regular updates on success are an effective incentive for district-wide participation. Effectively communicating energy usage information is what motivates people to take action; actions save energy and dollars.

### Savings Increase for Comprehensive Programs

It is reasonable to wonder how well this strategy works. In an analysis of 27 schools in Shasta County, the results were clear-cut and very informative. Schools with low energy savings (below five percent), generally had difficulty getting a program going for various administrative or personnel reasons. A few had very mature programs that had tapped most of the "quick-fix" savings. Schools with cost avoidance in the mid-range, 6% to 10%, described programs that were only partially effective. They lacked maintenance activities or had a poorly coordinated Energy Patrol, etc. In the third group were schools with a cost avoidance of 15% or more. All described a comprehensive program involving each segment of the school community. When limited staff time prevents a comprehensive program from being adopted, hit-and-miss implementation, reduces the potential for energy savings.

### *KEY ELEMENTS*

***What follows is a description of the key elements for planning and implementing a district-wide energy education/management program whether your district is small, medium , or large, located in rural, suburban ,or urban community. The first seven elements showed the most significant relationship to stable or decreasing energy consumption in a wide range of schools districts and are discussed first. It is difficult to develop a definitive list. Various combinations of all the elements have been observed in successful energy programs throughout California. The recommendations are generalized and should be implemented where applicable to your district.***

## ORGANIZE ENERGY DATA

**Data on energy usage trends and cost forms the basis of an energy management program and provides a quantifiable bottom line.**

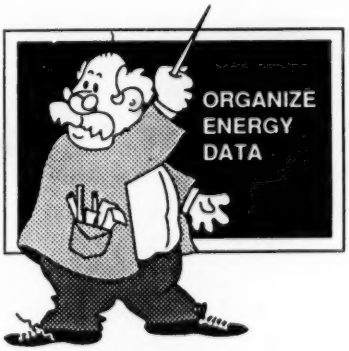
High energy costs are not a real concern until the data can be compared with other costs on a site specific basis. If energy is to stay in the running during the competition for resources, top level managers must understand the scope of the problem. District administrators must be fully aware of energy's impact on operations and convinced of the value in making energy management a priority. Proof that energy costs are more per student than dollars available for books and supplies, or materials is alarming to most. In many districts, utility bills are the largest continuing expense with the exception of salaries.

**All of the districts analyzed that had stable or declining energy consumption monitored energy usage and cost regularly. Of those with increasing consumption, only half kept such data.**

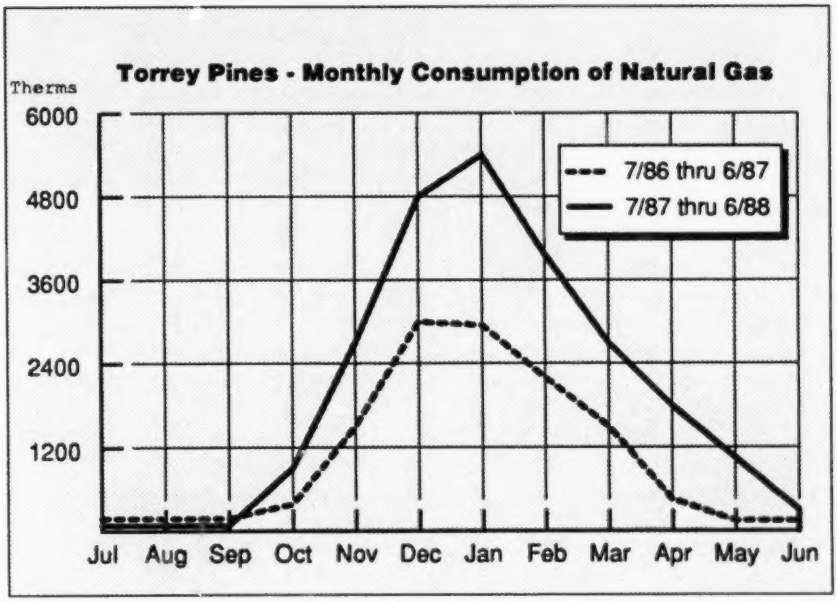
### Computers Do the Job

The first step for many districts has been to determine just how much energy each site or facility is using. Inexpensive computer programs, such as EN-ACT, developed by the Washington State Energy Office, do the rest of the work for you. About two-thirds of the schools monitoring energy consumption use computers. By charting the electricity and natural gas, propane, or heating oil usage on a monthly basis, the amount of energy your district uses at different times of the year can be compared to energy use patterns of past years. By designating a specific year's energy use as a baseline, one can: 1) predict the anticipated decrease in energy consumption and costs with an energy management program; 2) catch billing errors; 3) independently measure the savings of the energy program; 4) budget for energy expenditures; and 5) prioritize capital outlay expenditures for energy management.

Another way to grab the attention of Board members, in particular, is to translate that monthly information into the average energy cost per student. It is critical when presenting energy



information to the Board that energy consumption be in understandable terms that have relevance to the situation in your district. Convincing the Board of the importance of energy management can be the one most critical use of energy data. Reporting on the program in terms of "dollars saved" encourages decision-makers to support further investments.




*An example of a computer-generated "energy use report card" comparing natural gas use. The report "caught" an 80% increase which otherwise would have gone unnoticed.*

## Energy Use Report Cards

Energy information can then be ranked and plotted graphically for each school in the district. **Three-quarters of the schools with declining energy use in the CEES 1988 study provided monthly reports to schools.** These reports, sometimes called "energy use report cards," are the cornerstone of an approach that acknowledges the importance of personalized information in influencing energy conserving behavior. Principals and custodians, unlike district-level staff, know what happened in the school each month. Thus, monthly data is far more useful because they can "see" the effects of holidays, special events or malfunctioning equipment.

Most reports contain information on each school in the district to facilitate comparison. Several energy managers felt this was a great motivator for schools with small cost avoidance.

This graphic display can also reveal a new perspective on summer school and extra-curricular use of schools. In Sacramento City Unified School District, energy data was used to determine which schools to open in the evening hours. Why not open those schools that operate efficiently rather than those that aren't energy efficient? During a period of declining enrollment, Cupertino Union School District used energy efficiency as one criteria for selecting those schools to close.

## BUILD SCHOOL BOARD AND TOP LEVEL ADMINISTRATIVE SUPPORT

**The School Board that is committed to energy management sends a strong message to administrators, teachers and other staff that energy is not a one-shot problem, but a continuing effort for the district.**

A strong School Board policy is a crucial link between the community and its school system. It reflects the community's desire that the schools actively pursue reasonable ways to save energy and excessive energy use is wasted tax money.

Although energy programs offer opportunities to reduce costs, a narrow focus on only the savings can reduce the chance of success. To build support within the school board, energy management must relate to the Board's accepted goals and priorities. Issues as divergent as "accountability" and "the drought" can easily be linked to an energy management program as the attached resolution shows.

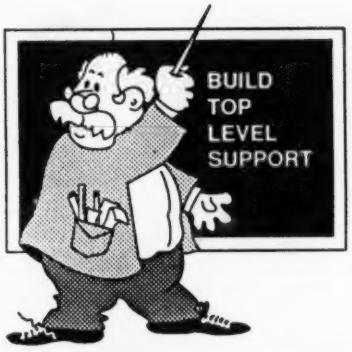
Without an established board policy, energy management will lack the direction, support, budget, and the administrative backing to become an effective program. The resolution should encompass all aspects of the district's operation, e.g., educational programs, budget process, facilities and services management, maintenance, transportation, food services, purchasing, personnel procedures, administrative services, outside users, new construction and comprehensive planning and scheduling. It assumes the intention to **replace** existing practices with "energy management" practices that prove successful.

An effective resolution should contain the following:

- Statement of concern regarding the long-range energy situation.
- Statement of commitment to energy management.
- An implementation plan.
- Reporting requirements.
- Allocation of Resources (staff and budget) to get the job done.

Energy policy can be incorporated by making each site or department responsible for its' energy budget. By including an energy reduction goal as part of the principal's, maintenance director's or operations manager's performance objective, a Superintendent has taken a major step in insuring a high level of awareness and eagerness among his or her employees to substitute new programs for old. Once top level support is gained, principals, teachers and staff are more eager to support the energy program. The support and performance of these people is integral to the project's success because they have control of energy at the schools. Very few projects of any significance are implemented by one person.

Administrators need to be "sold" on what is in it for them and convinced that staff comfort and productivity will not suffer. Teacher discomfort is one of the greatest obstacles to energy management and one of the most difficult to overcome.



Getting it in writing through a resolution and participation contract will help avoid miscommunication and clarify expectations.

***RESOLUTION OF COMMITMENT IN SUPPORT OF AN ENERGY AND WATER MANAGEMENT PROGRAM***

WHEREAS, The _____ Governing Board recognizes the responsibility of the District to reduce the waste of energy and water to as low a level as possible without compromising the basic mission of the District; and

WHEREAS, the Board desires to help students and members of the community understand the need for the wise use of natural resources; to promote an understanding of the relationship between reduced resource consumption and the quality of our environment; and

WHEREAS, the State Auditor General and the Commission on State Government Organization and Economy have recently raised concerns as to whether public school districts are held sufficiently accountable for their fiscal policies; and

WHEREAS, the Board recognizes that funds saved as a result of an energy and water management program can be re-allocated in support of other District needs; and

WHEREAS, the Board recognizes that conservation programs are best accomplished when energy and water management is coordinated with education and training.

NOW, THEREFORE, BE IT RESOLVED that the Board allocate sufficient resources to implement a program of effective energy and water management and resource education and that the Superintendent be directed to formulate and maintain a District Resource Management Plan that includes energy and water use reduction goals, a strategy to increase awareness among employees and students of the need to conserve resources, procedures to conserve energy and water, and a program to monitor energy consumption. Progress in carrying out this plan shall be reported to the Board at least on an annual basis.

PASSED AND ADOPTED by the Governing Board of the _____ District of _____ County, California, on _____, by the following vote:

AYES:
NO'S:
ABSENT:

Long term continuation of an innovative program such as energy management does not just happen. The Board holds the "purse strings" and therefore must be constantly reminded that their approved expenditures for hardware, staff training and the energy manager's salary will be rewarded with cost avoidance in excess of their investment. **In the 1988 CEES study, reporting to the Board was a significant factor in schools with declining or stable energy usage.**

## CULTIVATE MAINTENANCE AND OPERATIONS SUPPORT

**Custodians and maintenance staff are the first line of defense against energy waste. They must be part of the energy team.**

School buildings, for the most part, were designed primarily with initial cost in mind. This policy resulted in the construction of many buildings that, by today's standards, are oversized and use excessive amounts of energy. The burden for operating these buildings falls most squarely on the Maintenance & Operations (M&O) or Buildings and Grounds department which is responsible for safeguarding capital investment, increasing the useful life of the facility, promoting health and safety and providing an appropriate environment for learning.

For a variety of reasons, school facilities have been allowed to deteriorate, yet maintenance programs have been given low priority in the annual budgetary process. Energy management should not be seen as competition for scarce district resources, but rather another voice for programs conducted in a planned, preventive manner rather than responding to breakdowns. Comprehensive energy programs often provide extra resources or rationale to justify preventive maintenance projects.

**All districts with stable or declining energy use in the most recent CEES surveys have active support from the M & O departments.** Although commitment from the administration is vital in an energy program, there has to be support from the people who push the buttons and pull the levers. In fact, how the lack of support undermines success has been documented in several districts. In the long term, this relationship is even more important as mature energy programs are often transferred to the M & O department.

In some districts, there is a natural relationship between that M & O support and energy management because the manager is often within a position of authority within the M & O department. If energy is an administrative function, energy managers need to be careful not to threaten the traditional power and authority of the M & O department, but share ownership of the program. In doing that, the different needs, concerns and priorities of the energy program can be effectively integrated with those of the M & O department. This makes it easy for energy-efficiency to replace existing practices and become standard operating procedure. The well-kept school not only serves as energy efficient housing for the pupils, but the energy program serves as a laboratory for energy education and a center of community life.

## SUPPORT "IDEA CHAMPIONS" AT ALL LEVELS

**The "Idea champion" is the person with the vision, desire and skills needed to promote the program and motivate all to participate.**

The role of the idea champion is usually to bring the idea for the energy program to fruition. Unless there is somebody behind an idea and willing to take the risk of speaking up for it, the idea will disappear. National Science Foundation and Rand studies suggest that the idea champion's role is crucial in this process. Daft and Becker in their book, *The Innovative Organization: Innovation Adoption Efforts in School Organizations*, state that a key element for innovative change in schools is the presence of an "Idea Champion."

### Energized By Commitment

In energy programs, he or she is usually a principal or middle level administrator, but may be a teacher. Most often it is the champion, hero or prime mover, as they are often called, who assumes the role of energy manager in the beginning. **Three-fourths of the successful programs recently surveyed by CEES had an idea champion who emerged from the ranks.** As the electrical foreman in one district put it, "The program works because of the energy manager (idea champion). If he left, the program would die." This had indeed happened in many districts, but can be mitigated if the "gauntlet is passed on."

This kind of leadership involves communication and conviction, energized by commitment. Persistence, staying with the project long enough to make it work, is also a key trait. To some extent, every project has some tough going in the middle.

### Advocate for the Program

Idea champions can't do it alone. Selling the idea means developing a group of supporters to implement the program. They also need to be supported by an administrative sponsor who runs interference for the idea champion and assumes responsibility for the program. The sponsor should be ready, willing and able to help in three ways: acquiring the necessary resources, ensuring a budget allocation and fending off political attacks. This role of protector involves acting as an advocate for the program in front of the superintendent and school board. Often the sponsor or "executive champion" is a former idea champion who understands what it takes to push an innovative program. He or she may be a Business Manager, Assistant Superintendent or Maintenance & Operations Supervisor.

Administrative mentors are not usually found. Competent energy managers and idea champions recruit these individuals, sell them on the benefits of energy management and work hard to keep them regularly informed about the progress of the programs. As with the idea champion, successful energy programs were more likely to have an administrative mentor.

## SET YEARLY GOALS

**Specific program goals and attainable energy saving objectives provide a framework for the energy program.**

Planning and yearly goal setting in energy management programs typically relates to the specific reduction of energy usage and cost such as a 10% annual reduction or the maintenance of existing savings. **None of the districts in CEES's 1988 survey with increasing energy use had yearly goal setting, while two-thirds of those with stable or declining energy use did.**

Energy plans and goal setting are as important for political reasons as they are for management guidance. An energy plan with yearly goals becomes a roadmap for activities that will lead to changes in behavior and the installation of equipment to manage energy use more efficiently.

### Renew Commitment

By setting goals, the program calls attention to itself and renews the commitment of those involved in the program. In California, schools have taken either the "hardware highway" or "people expressway" to energy management. The "hardware highway" focuses on the installation of energy efficient technologies such as computerized energy management systems, energy efficient light fixtures and HVAC retrofits. Those schools lacking sufficient capital improvement budgets or federal grant money have usually taken the "people expressway" and emphasized behavioral changes such as operating equipment more efficiently (e.g. re-setting timeclocks or preventive maintenance) and increasing awareness through energy action projects such as the Energy Patrol or the Energy Watch class. Research by CEES has shown that a combination between both approaches is optimal. By ignoring the behavioral aspects in particular, a district only cheats itself out of "cheap" savings.

### Clarify Benefits and Services

Use guidelines set forth in the governing board resolution and the district energy data to design the district's energy plan. (A proposal or energy plan that identifies strategies may be needed to gain approval of a resolution for the energy program.) The energy plan should make it clear what services will be provided, what is expected from schools, and what benefits are expected. Be conservative in your energy saving estimates, at first, to ensure that the program is successful. A long range perspective indicates that energy is more than a passing fad.

## APPOINT AN ENERGY COORDINATOR

Energy managers can also be likened to a coach, offering sound advice, motivating improved efforts, and providing support while the school travels on the path to improved energy efficiency. Some of the most effective are generalists familiar with the many different operational areas of the school. As John Naisbit noted in his blockbuster, *Megatrends*, "We are moving from the specialist who is soon obsolete to the generalist who can adapt." Without someone in charge, energy has a tendency to get lost in the shuffle or buried by the crises that daily confront a school.

**Some of the most effective programs have given responsibility to one individual to direct, coordinate, and track the progress of the district energy plan. This person, usually working part time, orchestrates the entire district program and keeps the momentum going.**

### Rapport with Staff

People may be the district's most important resource in managing energy. Thus, energy managers must have good rapport with staff members to mobilize that resource. Energy managers must have the authority and respect required to get things done since it will be necessary to recommend procedural changes across the district.

Personnel assignments will depend largely on a district's size, staffing requirements and internal structure. A good rule of thumb is: if a manager can be put in place with staff, space and related costs for 10% of the current energy budget, a school system can't afford **not** to hire an energy manager! One energy manager saved more than twice his salary!

### Generalists to Coordinate

Less than ten percent of districts responding to a statewide survey in 1985 had full time energy managers. District's with at least half-time energy managers in CEES 1988 study averaged 30,000 ADA, although there is not a relationship between district size and energy reduction. Schools with stable or decreasing energy costs in the 1988 survey had, on average, an energy management position of .47 full-time equivalent (FTE). In contrast, the five districts with increasing energy consumption averaged .14 of someone's time devoted to energy. CEES studies so far do not indicate a minimum level of staffing needed to keep energy management alive once it has been integrated into normal district procedures.

**WHAT ALSO WORKS**

***In statistical analysis, the following elements were not critical for ALL districts, but were very much at the core of certain successful programs. Most refer to strategies that will assist an energy manager in carrying out his/her responsibilities and need to be examined in the context of the particular district and the people that make it work.***

## CONDUCT AN ENERGY SURVEY OR AUDIT

**The purpose of an energy audit is to identify wasted energy and gather basic data for a prioritized list of practices and measures to conserve energy.**

The energy audit consists of an on-site review of a school and its energy-using equipment and a written report summarizing the findings. The report describes the existing energy use patterns of equipment and identifies strategies for improving energy efficiency based on calculations of cost, savings, and payback. As an analytical tool, it provides hard data to aid in decisionmaking about energy investments.

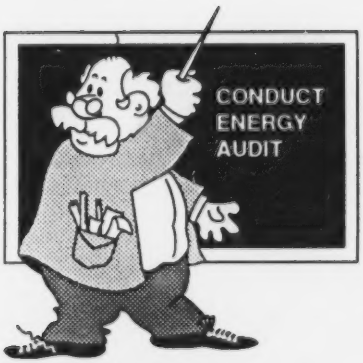
### Different Things to Different People

In general, audits may be classified into three broad categories based on who collects and analyzes the data: 1) do-it-yourself, 2) walk-through survey by a trained energy auditor, and 3) technical audit conducted by a registered engineer.

A **do-it-yourself** audit requires school staff to both gather and analyze the data with the help of a workbook. In a related version, the data is gathered by the school using a questionnaire and sent to an auditor for analysis.

A **walk-through** survey is a visual inspection of the facility by a trained energy auditor who primarily identifies energy saving maintenance and operations (M&O) changes. Energy auditors are usually capable of determining the savings from some equipment changes such as re-lamping. While the school may receive a narrative report, many auditors leave a checklist summarizing the findings and suggested M&O practices. Another function of the walk-through is to determine whether a more detailed technical analysis is warranted.

The third and most detailed review, the **technical** audit, is conducted by a registered engineer who identifies more costly energy saving measures. The analysis is more complicated as the auditor often focuses on energy-using systems such as heating and ventilation (HVAC). An important aspect of the technical audit is an analysis of expected cost savings and payback.




### On-Site Survey and Written Report

In general, both the walk-through and technical audit begin with an interview of school personnel to verify site information, schedules for equipment use, and M&O practices. That is followed by an inventory of equipment, its energy characteristics, and control settings. The third step is an analysis of the data either by hand or with a computer program. Calculations quantify areas of waste and the potential for savings determined.

The final step is to communicate the findings in a meaningful format. Pages of data and engineering calculations are of little value for decisionmaking if not understood by school personnel.

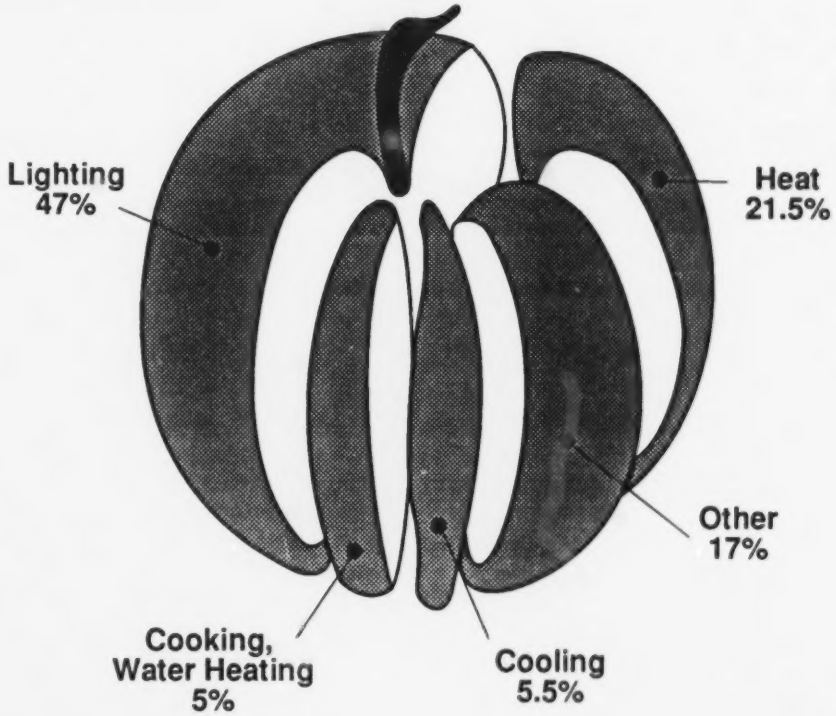
For a technical audit, the meat of the report is the expected savings and estimated payback because investments often require a significant capital outlay. The most useful report begins with the least cost and easiest to implement practices and measures. In a walk-through survey, less attention is given to calculating the payback because the changes usually save enough energy in a few months to offset the minor labor costs involved in implementing them. In both cases, the written report is best supplemented by an oral presentation.

### Linked with Energy Accounting

Which buildings should be audited first? The energy accounting reports show which buildings use the most energy per square foot and therefore offer the greatest potential for savings. Those sites should be the first targets. Once needed hardware changes and improvements are identified by the audit, energy accounting data from all sites helps staff prioritize single- and multiple-year projects that may require capital outlay. Such information can form the basis of a five-year plan as was the case in Los Angeles.

### Translate Data into Opportunities

Audits conserve energy only when schools act on the recommendations. Audits gathering dust represent lost opportunities to save money. In light of this, the primary responsibility of the auditor is to translate pages of data and engineering calculations into something that schools will find both interesting and understandable. Care must be taken to make sure the word "audit," with all its IRS connotations, is not seen as a fault-finding mission, but an opportunity for the school to take control of their energy consumption.




*The "apple" chart gives a general picture of energy usage within schools. Note how significant lighting is.*

## PROVIDE IN-SERVICE TRAINING FOR ALL STAFF

**In-service training is a valuable tool in energy management. No matter how sophisticated the equipment is, if people don't use it correctly, it will waste energy.**

Formal education merely provides a theoretical basis and limited amount of practical experience that serve as the foundation, not substitute, for further training. District commitment to training requires an adequate allotment of funds and release time to attend training sessions.

Training should provide participants with a clear view of how energy affects his/her job, the significant costs of school energy use, an understanding of how energy is used in the school and the skills for reducing energy costs. Technologies and practices for energy management have changed dramatically over the last few years. It is especially important for staff to feel at ease using computers and sophisticated heating equipment. Old myths about energy have been shattered, yet folk knowledge is hard to overturn, e.g. turning out fluorescent lights if you leave the room for one second SAVES energy!

### Builds Confidence

Providing energy-related training opportunities for district staff develops increased confidence and encourages staff to use their creativity to think of additional ways to reduce school energy costs. Trained staff can effectively substitute old practices for new, energy efficient ones. Custodians in Napa are actually trained to become the district's energy management system instead of a computer. According to several energy managers, "If custodians don't understand the equipment, they'll simply set the controls on manual and override the system." LA Unified found this increased HVAC energy use at one school by 43%..

### Hands -On Training

Most training should probably be conducted in a classroom setting under the guidance of a mentor, with a variety of other informal experiences and materials supplementing the classroom instruction. Mentors or peers usually receive high marks as trainers because they are familiar with actual equipment and situations. Training should focus directly on the behavior school people will be expected to practice when they return to the school. Using an actual school as a laboratory for hands-on practice has been very popular and effective for CEES over the years. Informal or unstructured time in a training session is valuable for generating ideas or problem solving. The trainer or administrator "hears people out" to discover their concerns and needs.

A district may choose to develop its own energy training program or piggyback in-services provided by the local county office of education, utilities, community colleges, universities, government agencies or local professional groups. A variety of strategies can augment training including mini-workshops on a specific activity or piece of equipment (meter-board workshops for teachers, summer shutdown for maintenance staff), problem-solving sessions (trying to figure out why electricity use shot up in December), specialists to tutor a team (how to use electronic boiler tune-up equipment), mentor program (videotapes of retiring custodian doing his rounds or teachers sharing lessons on energy) and peer exchange programs.

## INTEGRATE ENERGY EDUCATION WITH MANAGEMENT TO INVOLVE TEACHERS & STUDENTS

**Energy education can come alive for teachers and students by making the school an energy laboratory.**

The school is an important part of the students' world—the place where they spend half of their waking hours for thirteen or more years. It is the place where they learn about the world and their place in it. Energy education lets them make a difference.

Energy education can put a spark into curriculum since students have a chance to really do something. **"My first motivation for getting started was that too often students say 'I'm never going to use this stuff when I graduate'," remembered Roger Ebbage, a building trades instructor in Oakland. "Energy management is relevant once they start paying the bills."** While the actual dollar savings from energy education are hard to quantify, it does prepare students for decisions they will have to make as adults that, day by day, are increasingly dependent on a clear understanding of the links between science and public policy.

### Not Just Science

When energy education is mentioned, there is a tendency to think science. Indeed, energy concepts are taught more by science teachers than any others. In the new Science Framework, energy is one of six thematic strands to be woven through all science education. The California Assessment Program (CAP Testing) has an entire section on "Energy: Sources and Transformations." A few years ago, Chapter 5 of the Education Code was changed to require the Superintendent of Public Instruction to take any steps necessary to encourage schools districts to provide some form of energy instruction.

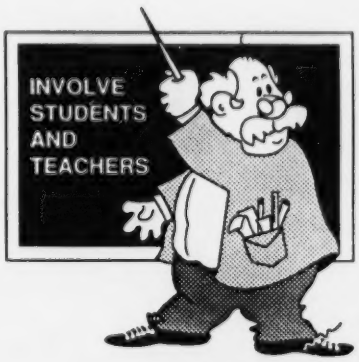
Energy can easily be infused into the curriculum because it is relevant, interdisciplinary, and can be taught at all grade levels. As a context to develop basic skills in math, reading comprehension, writing, or public speaking, the possibilities are limited to one's imagination. Although textbooks don't get high marks for their treatment of energy, there are many curriculum materials available, so it isn't necessary for teachers to develop materials, just adapt them to fit their needs. (*The Animated Bibliography*, available from the California Energy Extension Service, lists many.)

### Teacher Training Sought

But teachers must be provided with the most current information to pass along to their students. Opportunities for continuing teacher training allows teachers to "buy-in" to the program as well as providing meaningful learning opportunities for students.

One strategy is to link operational procedures with the curriculum. By transferring written lessons into "hands-on" activities, both students and staff benefit. Students learn by doing and district staff gain very active site energy coordinators. For example, math activities could emphasize basic skills by having students graph district energy use data and calculate the percentage their school uses.

One teacher noted, **"It's my students who keep me involved in energy education. I'm willing to do the extra activities that make a difference because of them."**



## PROVIDE INCENTIVES AND RECOGNITION

**Providing recognition or incentives keeps people interested in saving energy and makes everyone a hero!**

Energy programs can actually generate revenue, so it is possible to return a portion of the savings through cash awards or "energy dividends". By "re-investing" a portion of the savings in the people who made it possible, staff are encouraged to support the energy program. Nearly one third of all districts surveyed by CEES in 1988 return a portion of the savings to the energy manager, maintenance staff, or the schools themselves.

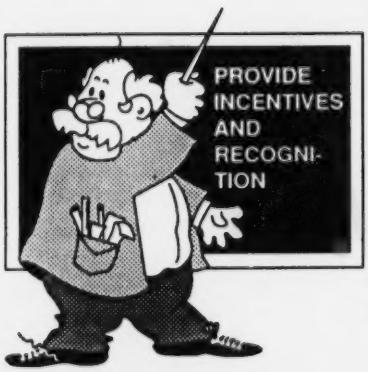
Don't make the goal too difficult to achieve. Research indicates that a high degree of winners, in the range of 10%-60% of the total number of schools or staff, encourages people to believe they can be part of the "winning circle." The greater the possibility of success, the stronger the motivation to achieve.

### A Mix of Incentives Works Well

Decisions about which incentives will motivate staff must reflect a balance between organizational and individual needs. Reward everyone who contributed to the success of the program in a way that is meaningful to them. Just presenting a plaque that says "Your effort is appreciated" may be enough, though you must judge if it will be an effective motivator.

Pay increases or bonuses are just one way to recognize and motivate outstanding performance. A couple of energy managers feel cash awards are not appropriate for "something (energy management) they are supposed to do anyway." As the energy manager in Los Angeles quipped, "None of them (site administrators, maintenance and operations) are motivated to take actions for the good of the District unless their branch receives some tangible benefit from that action." Two other strategies are improved working conditions and non-monetary recognition or awards of some sort.

The conditions in which teachers, principals, maintenance or custodial staff work, support or detract from their ability to do their jobs effectively. Examples of possible improvements in working conditions include providing discretionary funds to schools and/or staff for supplies, materials, and other instructional expenditures; hiring administrative aides to handle routine matters; enhancing school appearance and amenities; proving improved work areas for teachers and staff to use during noninstructional time, and generally focusing more resources on support for classroom teaching and preventive maintenance.




### Recognition Motivates Staff

While dividends or bonuses are most often given for reaching energy reduction goals, recognition is important for staff whose actions save energy. Awards for exemplary performance of a job, teamwork, or a particularly innovative approach are equally important. Staff are concerned about the extra demands on their time and the lack of recognition for a job well done. Just publicly saying "Thank You" or "Your effort is appreciated," goes a long way toward motivating them to save energy.

Oakland Unified recognizes the "best custodians" in energy management and schools that reach savings goals at an annual awards banquet. Articles in the school paper or a local daily,

highlighting staffs' special accomplishments, are also effective. Distributing awards or dividend checks at regularly scheduled meetings is the strategy LA Unified uses to gain visibility for the program and increase participation, not to mention "photo opportunities." Students are impressed with such things as parties, field trips, and patches for backpacks or jackets.

### Sustained Attention Reduces Difficulties

Most incentives, particularly those linking monetary awards to performance, require sensitivity to employee distrust of performance appraisal systems. Overly subjective reviews or measurements that lack validity are the greatest obstacles to making monetary awards work. Energy accounting helps overcome that by basing awards on a quantifiable bottom-line that schools can verify themselves.

Another difficulty with energy dividend programs is that they assume schools can keep generating savings year after year and that all schools have the same potential for savings. For schools with a long history of conservation, each new measure or practice has diminishing returns in saving energy. To address the concern that the majority of savings has been realized, some districts such as Clovis, reward the maintenance of savings as well. Other districts set goals based on surveys of potential savings. Most have been able to develop a strategy to overcome local concerns.

## DEVELOP INITIATIVE WITH DISTRICT AND SCHOOL TEAM

**A school site energy council makes things happen at each school. It is a vehicle for translating training and policy into action and building support from the bottom up.**

Both district energy committees and site energy councils provide opportunities for self-management as teams pull together to tackle the energy problem. They work well because problems are observed "from the classroom up, not the boardroom down."

Each school team sets its own strategy within the context of overall energy reduction goals of the district. The bottom line for success is tangible: reduced energy consumption.

Research indicates that when people are allowed to manage themselves, they show more initiative in fulfilling both personal and organizational goals. The highest form of self-management is "**intrapreneurship**," improving practices and programs *within* an established organization. This has been the modus operandi at some of America's best-run companies for several years and is observed in some schools striving for excellence.

Energy management is well suited to this "team approach" because it is a project that can't be successfully implemented by only one person. Teams are particularly appropriate for increasing collaboration, building consensus, allowing those affected by a decision to be represented in making the decision, and training staff to acquire new skills.

### Involvement Develops Commitment

Participation in an energy committee, whether it is at the school or district level, involves more people than just the energy manager. It helps create that "critical mass" that some believe is crucial for success. Decisions are better implemented because of the psychology of ownership. A sense of ownership is particularly important for the M&O department. A district energy council, particularly for a large district, may be an important mechanism for involving the M&O department in the energy program. It may be fairly formal as in Los Angeles and have representatives from the district level, administration, business office, maintenance and operations, or informal as in Napa where the energy manager and head of M&O meet periodically. In either case, all of the appointees should have an active interest in energy and commit enough time to do the job well.

While the vital role of improving communication is an important one, the district energy committee also serves to:

- Offer advice on policies and actions.
- Prioritize expenditures for energy saving projects at various facilities.
- Act as a liaison between the schools, top level administration and the school board on energy goals and policies.
- Communicate energy use data to each school.

At the school site level, the "intrapreneurship" role is more pronounced. The energy manager provides the structure by establishing the guidelines for each site committee and providing models of successful strategies to emulate. In Cajon Valley, near San Diego, the role of the school energy council is to: 1) Develop and

carry out a school site energy plan with specific strategies, appropriate for their school and in accordance with guidelines of the district energy plan; 2) Communicate possible solutions, needs and problems between the groups represented, the entire school community and the district energy committee; and 3) Review monthly energy consumption data and adapt plans accordingly. At Avocado school, a fully air-conditioned facility, the committee led the way to reducing electric usage by 25.7% and gas usage by 11.3% in 1986-87.

In Los Angeles, the mandate is less formal. Schools are advised of the opportunity to receive cash awards for energy cost reduction and are left on their own after an initial orientation at monthly principal's meetings. Although the average award is in the range of $1,000 to 2,000, Whitney Special Education High School received an award of $12,724 in 1986-87. That was 25% of what they saved the district. The principal remarked that he noticed a definite attitude change and everybody bought into the program, but "it was the kids who kept the teachers involved with their excitement for the program."

## Role Changes Over the Years

Although the importance of establishing a school committee was substantiated by the Rand Corporation in a four year study of innovative educational efforts and is noted in other studies of exemplary schools,the jury is still out on how successful this strategy is for long term energy programs.

School teams are particularly effective in getting a program off the ground and focusing attention on energy. Several districts have successful teams, either formal or informal, in place. In Oakland, it is the members of the "O'Team" and the "energy czars" at each school who devise plans to save energy based on a strategy outlined in the O'Team energy manual. Carpenteria is another district with a team-based program. In Los Angeles, as noted earlier, teams are more informal, but seen as the key to winning energy awards. As one principal noted, "We were successful because of teachers and students working together." Another recalled that the "wonderful part was the way the custodial staff and teachers came together in a way to approach instruction and the children."

Several programs reported having highly successful teams, but the teams died out over time because it was difficult to maintain interest. This is not surprising since teams are not usually the most effective way to get results when no one is interested in or cares about a specific issue, e.g. energy. Linking the teams with an award or energy dividend program where a percentage of the dollar savings are returned to the site, seems to be a key in maintaining teams over the long term.

## MAKE THE PROGRAM VISIBLE

**A "special project," as energy is often perceived, is easy to eliminate without support.**

Don't keep anyone in the dark! The program needs to be visible to both the general public and members of the school community. Mobilization strategies that involve and inform the public in the early stages of the energy program can give the district the political backing it will need later on in dealing with personnel and funding allocations. The school board and broader community that are not appraised of energy management activities and cost avoidance cannot adequately rate the importance of the program compared with other pressing priorities. A "special project," as energy is often perceived, is easy to eliminate without support.

With community support, the energy program stands a good chance of being continued, but its effectiveness is likely to be limited unless it is supported by staff because energy management depends on people. Staff support, cooperation, and action all begin with effective communication. Staff need to be informed which actions save energy, motivated to take those actions, and receive feedback on the effectiveness of their actions.

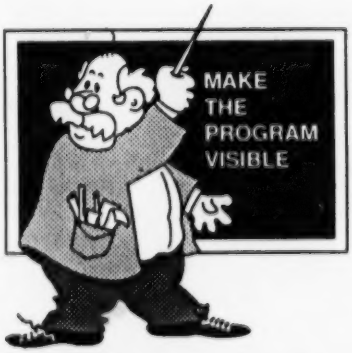
### Energy Relates To Every Job

Everyone needs to understand how energy relates to their goals and objectives. For example, why should a school board fund an energy management system (EMS) at the expense of classroom materials? Why should faculty care that the district needs to replace a large boiler?

Shared information early in the process may avoid resentment that funds didn't go for more materials or a pay raise. Planned communication can explain how the controlled environment from the EMS and a new heating system will increase comfort and, that in the long run, reduced energy costs may help teachers gain the pay raises or supplies they seek.

### Share Success to Build Support

Effective communication is planned and orchestrated. The responsibility for reaching the public lies primarily with the superintendent's office or a community relations office, but it is the energy manager's responsibility to keep those offices informed of proposed activities and energy cost reduction. Most political problems stem from insufficient "public relations," especially during budget review. The opportunity to share achievements often turns a school's energy problem into a positive public relations opportunity that demonstrates the efforts the district is taking to make the best use of public monies. When shared appropriately, energy accomplishments may bring more public support.




Graphic displays comparing energy costs on a month-to-month basis or previous years' use increase staff, student, and visitor awareness of the results of the school's energy conserving efforts as well as challenge people to save even more energy. Graphs can be generated easily with energy accounting software.

Poster contests resulting in calendars, light switch reminders or bumperstickers, motivate students and staff to think about energy conservation. Sevick Center, a handicapped facility in San Diego, achieved over $5,000 in eight months. They attribute the

majority of the savings to diligence and the wide-spread use of laminated light switch reminders.

### Graphic Reports Provide Feedback

Monthly or quarterly reports of energy use are the cornerstone of making the program visible to both school staff and the superintendent and acknowledging the importance of information in changing behavior. This feedback allows schools to track their progress and provides the opportunity for seasonal prompts such as shutting down systems for the holidays. Reports that rank schools tend to be a great motivator according to many energy managers. **Three-quarters of the schools in the 1988 CEES survey that had declining energy use, reported monthly to their schools.**

The essence of effective communication comes in knowing: your target audience, the purpose of the message or question, what and how much they need to know, and the most effective time, format and approach to reach them. Identifying who should get what information based on their differing needs, concerns and priorities continues to be the major challenge.

## ENERGY ACTION STRATEGIES

### Team Worksheet

School/District _____ Date _____

This "Bright Ideas" Team worksheet is designed to help your school/district identify which energy management and energy education strategies your school/district has implemented to date and which strategies could be instituted in the near future. Strategies are keyed to one of the twelve elements presented in the guide. Items that are bolded/asterisked are the foundation of an effective school energy program.

| | STRATEGY | PAGE | YES | NO | PROPOSED/DATE |
|---|---|---|---|---|---|
| SCHOOL BOARD | **** Board resolution to reduce energy consumption** | 9 | | | |
| | **** Budget capital outlays for energy efficient equipment** | 10 | | | |
| | Board resolution to include energy & resource conservation education in district course of study | 17 | | | |
| | Long range plan for energy management with specific reduction goals | 12 | | | |
| | Funding available for release time, training programs, workshops, etc. | 16-17 | | | |

Strategies used in our school/district which are not listed:

| | STRATEGY | PAGE | YES | NO | PROPOSED/DATE |
|---|---|---|---|---|---|
| ADMINISTRATION & SUPERINTENDENT | **** Analyze & report district utility costs on regular basis. Report to sites.** | 6-7 | | | |
| | **** Split a percentage of the savings or cost avoidance resulting from reduced energy use with schools & staff** | 18-19 | | | |
| | **** Assign specific energy responsibilities to key individuals & include in job description** | 11 & 13 | | | |
| | Publicize the success of the energy program | 22 | | | |
| | Consider energy & life-cycle cost in procurement, renovation & new construction | 8-9 | | | |
| | Seek funding through schools & hospitals grant/loan (ICP) & utility company rebate | 9 | | | |
| | Establish a committee to monitor energy use & set energy conservation goals and activities | 20-21 | | | |
| | Provide day to day support of energy management beyond policy statement | 11 & 22 | | | |
| | Consider energy use implications of managment decisions, e.g. nighttime football begins 1 hour earlier; "cold" lunch one day per week; purchase energy efficient refrigerator | 8-9 | | | |
| | Include a measure of his/her effectiveness at managing school energy consumption in a principal's yearly evaluation | 8 & 19 | | | |

Strategies used in our district which are not listed:

| | STRATEGY | PAGE | USED DISTRICT-WIDE | USED SOME SCHOOLS | PROPOSED/DATE |
|---|---|---|---|---|---|
| FACILITIES AND SERVICE STAFF | **** General energy audit of schools reviewed annually** | 14-15 | | | |
| | **** Most M&O audit recommendations adopted, e.g. remove excess interior lamps and ballasts; winter break shut-down; summer break shut-down** | 10 & 12 | | | |
| | **** Quick-fix measures taken , e.g. install energy saving lamps - interior; install time clocks on HVAC sytems; install "lockouts" (economizers) on HVAC system; install time clocks or photocells for exterior lights** | 10 & 12 | | | |
| | Routine maintenance problems addressed before intalling computerized energy management system | 10 & 12 | | | |
| | Preventive maintenance plan & training | 10 | | | |
| | Energy included in Deferred Maintenance Plan, renovation & new construction | 8 | | | |
| | Transportation maintenance, routing & fleet efficiency examined for fuel savings potential | (Vol II) | | | |
| SITE ADMINISTRATORS | **** Establish goals for energy conservation & monitor usage** | 12 | | | |
| | **** Provide in-service training for teachers & custodians** | 16 | | | |
| | Consolidate after school and night activity whenever possible | 8 | | | |
| | Provide recognition for energy conservation efforts | 18 | | | |
| | Begin an energy patrol (elementary level) | (Vol II) | | | |
| | Encourage teachers to use energy as a theme throughout the curriculum | 17 | | | |
| | Institute Dark Campus policy | (Vol II) | | | |

Strategies used in our district which are not listed:

| | STRATEGY | PAGE | USED DISTRICT-WIDE | USED SOME SCHOOLS | PROPOSED/DATE |
|---|---|---|---|---|---|
| TEACHERS | **** Infuse energy education concepts into existing grade & subject areas** | 17 | | | |
| | **** Make sure lights are off in unoccupied rooms and areas** | 14 | | | |
| | Use school as a "lab" for demonstrating energy conservation activities | 17 | | | |
| | Use natural cooling by opening doors & windows before using air conditioning | 14 | | | |
| | Close windows & doors when the heat or air conditioner is on | 14 | | | |
| | Participate in energy in-services | 16 | | | |
| COMMUNITY | **** Ask for regular updates on progress towards energy saving goals** | 7 & 12 | | | |
| | Support board & school efforts to save energy | 8-9 | | | |
| | Participate in incentives/awards ceremonies | 18-19 | | | |
| | Volunteer for school site energy committee | 20-21 | | | |
| | Form school partnerships to manage energy | 22 | | | |

Strategies used in our school/district which are not listed:

# NOTES

# NOTES